

A BRIEF SUMMARY OF MEDICAL FINDINGS IN THE MARSHALLESE
EXPOSED TO RADIOACTIVE FALLOUT TWENTY YEARS AGO

Robert A. Conard, M.D.

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This report is a brief summary of medical findings over a span of twenty years in the Marshallese people who were accidentally exposed to the radioactive fallout in 1954. In addition, a few comments are included on the radiological monitoring of personnel at Bikini.

The people on Rongelap Island received the highest exposure. The estimated gamma dose was 175 rads. This dose fortunately did not cause any acute deaths but did cause significant depression of blood elements. No severe infections nor any bleeding tendencies were observed while this depression lasted. Contamination of the body with fallout resulted in development of so called "beta" burns of the skin with spotty loss of hair beginning several weeks after exposure. Blood cell function had regained nearly normal levels by one year, and "beta" burns healed in several weeks with only minimal scarring and with regrowth of hair. These effects were less extensive in the 28 U.S. servicemen on Rongerik and were not present in the Utirik people. Though radiochemical urine analysis showed significant absorption of radionuclides, particularly radioiodines, no acute effects of this internal exposure were discernible and we mistakenly thought that there would be no late effects.

Follow-up examinations during the first decade, showed few findings that could be correlated with radiation exposure. The exposed people were generally as healthy and with about the same incidence of diseases as the unexposed population. No deaths occurred which could be related to radiation exposure. Possibly related to radiation exposure, was an increase to about double the number of miscarriages and stillbirths in the exposed

women during the first five years. Aging studies did not reveal any radiation-induced senile changes or reduced longevity. No radiation-induced cataracts were noted. Lymphocytes, cultured from peripheral blood revealed a low incidence of chromosome aberrations in the exposed people at ten years after exposure.

During the second decade of examinations, there have been serious developments not only related to medical findings but also to transportation problems and political interference.

Thyroid:- Growth retardation had been noted earlier in some of the exposed Rongelap children but correlation with thyroid injury was not established since laboratory tests then available for evaluation of thyroid function were normal. Early estimation of thyroid dose from absorbed radioiodines in the fallout led to the mistaken belief that it was too low to expect late effects on that organ. Reevaluation of the dose in 1965 showed that young Rongelap children probably received thyroid dose of 700-1400 rads and adults about 335 rads, including the gamma dose. The smaller size of the children's thyroid largely accounted for the greater dose. At about this time (1963) thyroid tumors began appearing in children and to a lesser extent in adults. More refined tests of thyroid function became available and provided laboratory confirmation that some children had reduced function of that gland. Thyroid injury was shown to be the cause of their growth retardation. More thyroid tumors continued to develop and at the present time 29 of 86 exposed Rongelap people (about 1/3) have developed thyroid abnormalities. Surgery on 25 of these people has been carried out in the U.S. Three women were found to have malignant tumors. During the past year benign tumors were removed from a boy who had been exposed in utero. Most of the Rongelap people have been on thyroid hormone treatment

for the past ten years and though improvement in children's growth has resulted and the medication is necessary to maintain normal thyroid state in the surgical cases, it is questionable if the treatment is preventing new tumors from developing. The observed incidence of thyroid tumors in the exposed Marshallese is considerably higher than might be expected from their exposure to ^{131}I alone. Calculated on a per rad basis, the observations are more consistent with risks after x-irradiation. The explanation is thought to be that many of the shorter lived isotopes of radioiodine present in the fallout may have a higher biological effect than ^{131}I .

Leukemia:- In 1972, a Rongelap man developed acute leukemia quite likely due to radiation exposure. He had been exposed at one year of age. In spite of the best possible treatment, at the Hospital of the National Cancer Institute, he died. This unfortunate death, together with the development of thyroid abnormalities, have been the cause of some anxiety among the Rongelap people.

Continued Monitoring:- Our medical team is conducting annual assessment of radiological hazards to personnel returning to live on these atolls. This is being accomplished by radiochemical analysis of urine, diet, water and by whole-body gamma spectroscopy. The results of personnel monitoring at Bikini over the past four years have been encouraging with body burdens of people living on Bikini considerably below those of the Rongelap people. A letter to this effect was recently sent to the District Administrator of the Marshalls for reassurance of the returning Bikini people. One of our most pressing problems for personnel monitoring both on Bikini and Eniwetak is the assessment of the plutonium hazard. Our personnel monitoring is coordinated with the monitoring of the environment which is done by a Brookhaven

group led by Meinhold and Greenhouse, as well as with work done by other laboratories.

Logistics:- The past five years have been particularly momentous for the medical team. Following the death from leukemia, we instituted blood examinations in the exposed people at six month intervals. The thyroid treatment program was not being strictly adhered to. For these reasons, a resident physician, Dr. Knudsen was placed in the Marshalls to help with the thyroid treatment program and render assistance with health care, particularly in the islands of Rongelap, Utirik and Bikini by inaugurating quarterly visits to these islands. Transportation problems have been acute with difficulties in chartering and scheduling of Trust Territory Cargo Ships which were already overburdened with schedules of their own. These ships are far from reliable and often have inadequate safety features. The AEC was sympathetic with our problem and realizing also the need for a special survey vessel for other radiological surveys in the Marshalls, last year obtained an LCU for survey use. This has been a tremendous help to us in carrying out our quarterly trips to the outer islands. The vessel is slow but can be beached and can haul our special whole-body counter and dispensary trailers.

Political Issues:- In 1971 local Marshallese congressmen made absurd accusations against us saying that the U.S. had deliberately caused the fallout accident in order to study the effects of radiation on human beings; that we were using the people as "guinea pigs"; that we were not reporting deaths from radiation etc. These unjust charges were most disturbing to our medical team and the situation became particularly frustrating when in March 1972 we had to halt the examinations at Rongelap due to political interference. The Congress of Micronesia then appointed a group of four

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well-known medical observers to accompany us on a survey. Their report was most favorable to us and since then we have been allowed to proceed with the examinations. Through all this our rapport with the Marshallese people never faltered. At this time the political climate is greatly improved and we hope we can carry out our responsibilities in the future without interference.

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